# IPCC AR5: new demands, challenges and responses

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# AR4 Data Portal Usage

- Volume
  - 12 TB of IPCC data
- Traffic
  - ~ 20 Mbps speeds
  - 5.5 TB/year soon after publishing
  - Went up to 30.4 TB in 2008

# AR5 estimates

- Volume
  - As much as 1 Petabyte of published data
- Traffic
  - Can anticipate hundreds of TB/year soon after publishing

# How we did it last time

- Experiment is run and data is recorded
- Custom CMOR application is run on data to create CMORized copy
- After a Quality Check, a set of scripts add the necessary metadata and transfer to data portal

# Potential Bottlenecks

- Publishing and CMOR
  - Data is sometimes archived before CMORization
  - CMOR rewrites all data that is published, which uses up both processing time and tape space
- Network and traffic

# Solutions

- Frametar integrated with FRE (FMS Runtime Environment)
  - Replaces new CMOR application
  - Saves processing and unarchiving time, tape space
- THREDDS(Thematic Realtime Environmental Distributed Data Services)
- LAS (Live Access Server)
  - On-the-fly visualization and access to data

# Solutions (cont.)

- New Data Portal hardware
  - At least 500TB of space
    - Currently 150TB
- Web Services
  - Analysis figures generation
  - Downscaling

# Statistical Downscaling

- Simulates sub-grid-scale climate based on output from global model and observations at data point
- Downscaling Process
  - Develop statistical relationship between model and observations (1960-1990)
  - Test relationship using subset of historical data (1990-2000)
  - Use relationship to generate future projections at the regional to local scale (2000-2100)

# Downscaling Webservice

- Architecture
  - Javascript Web Interface
  - Calls R downscaling model
  - Interface displays figures once dowscaling is computed

# Downscaling Webservice

- Downscaling Model
  - Current model is for illustrative purposes only
  - Written in R statistical language
  - Developed by Katharine Hayhoe and team at ATMOS research
  - Current model downscales temperature, other models are being developed

# Downscaling Webservice

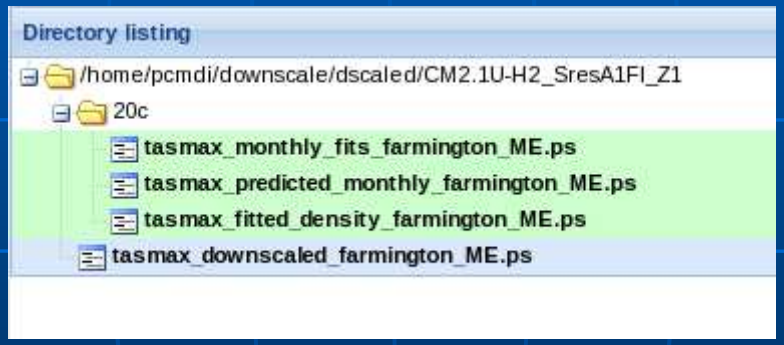
- Interface
  - Choose experiment, variable and (in the future) Observation data, time frame
  - Calls webservice, displays resulting figures through browser interface

# Thanks!

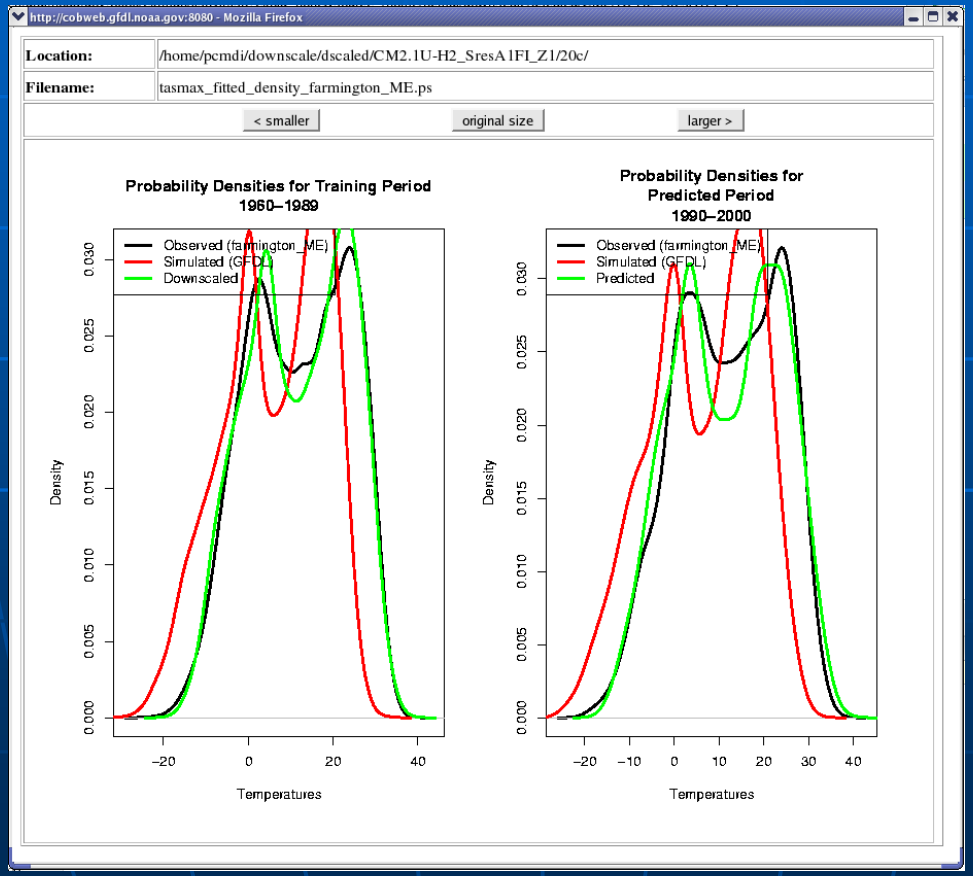
- Questions?

# Downscaling Webservice

# Downscaling Webservice

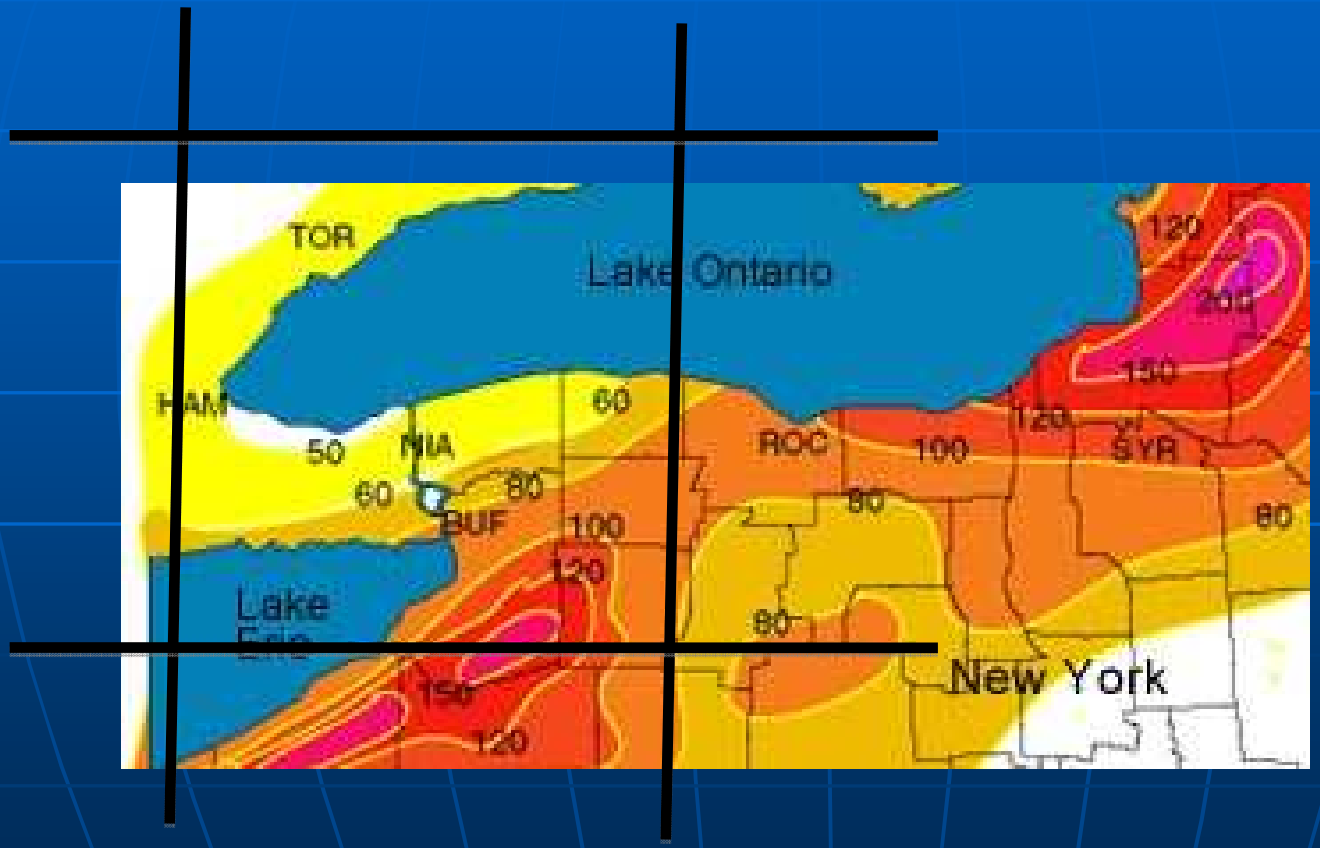


# Downscaling Webservice



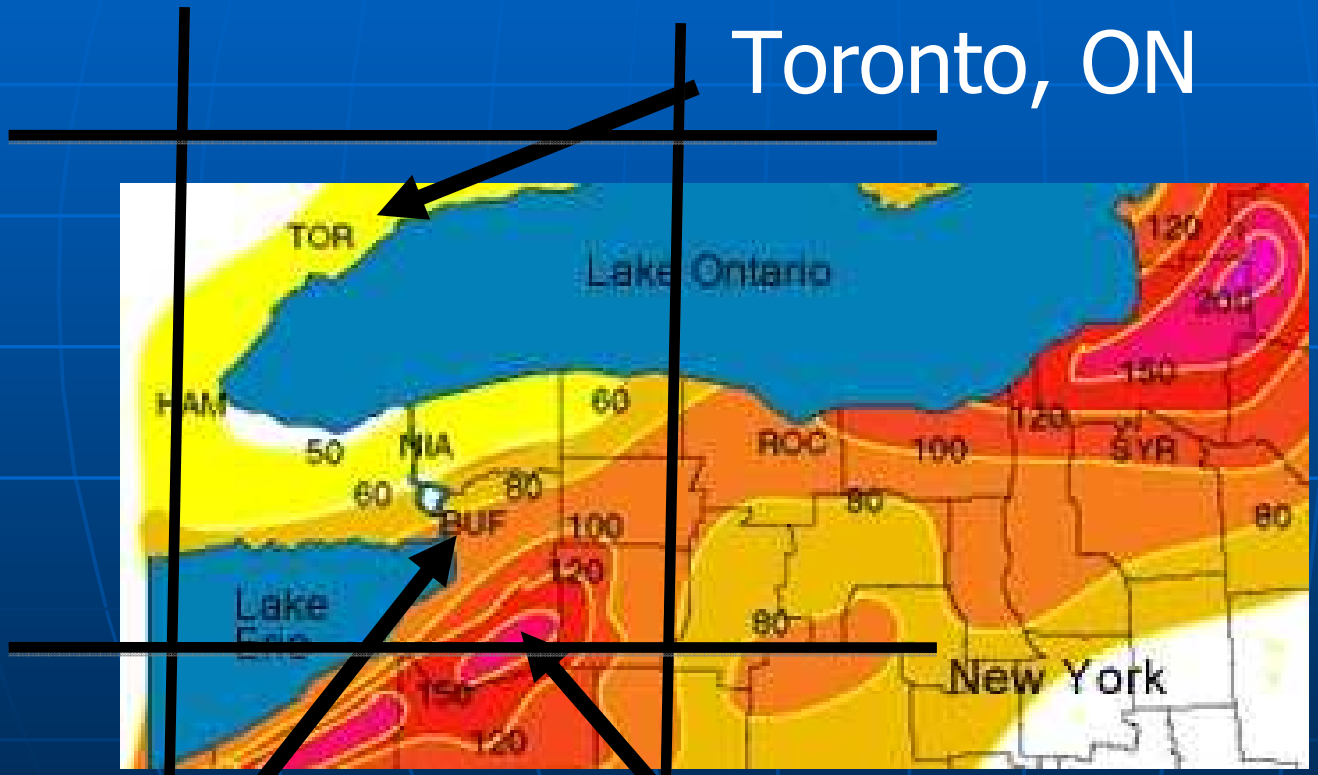
# Why do we need downscaling?

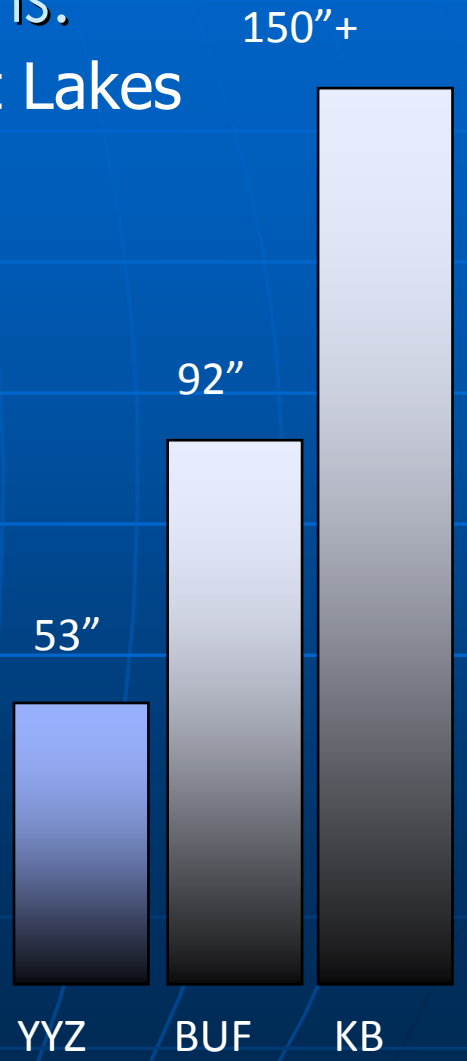
Example: Average winter snowfall in the Great Lakes

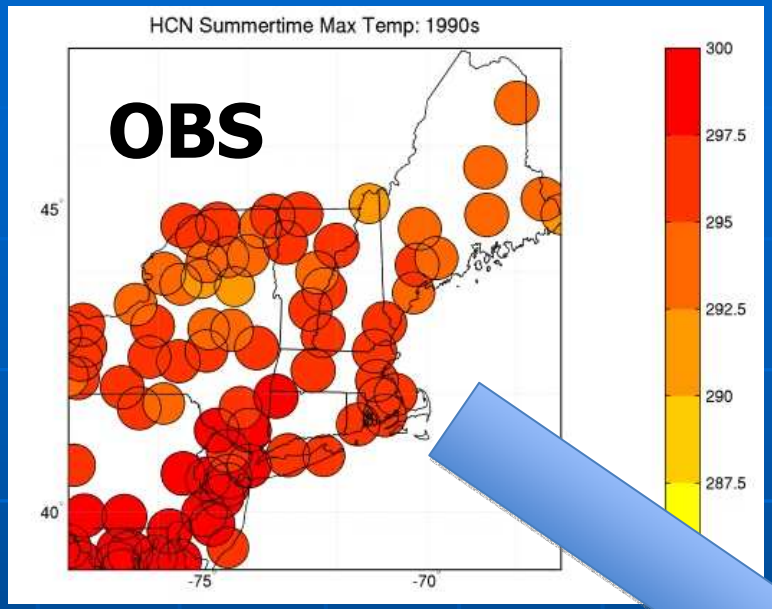


Because a typical GCM gridcell averages over a set of unique different local conditions.

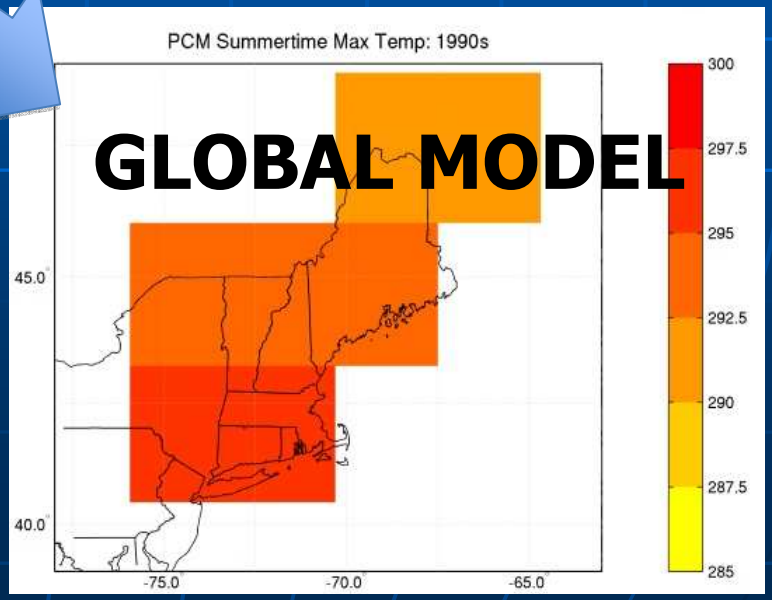
Example: Average winter snowfall in the Great Lakes



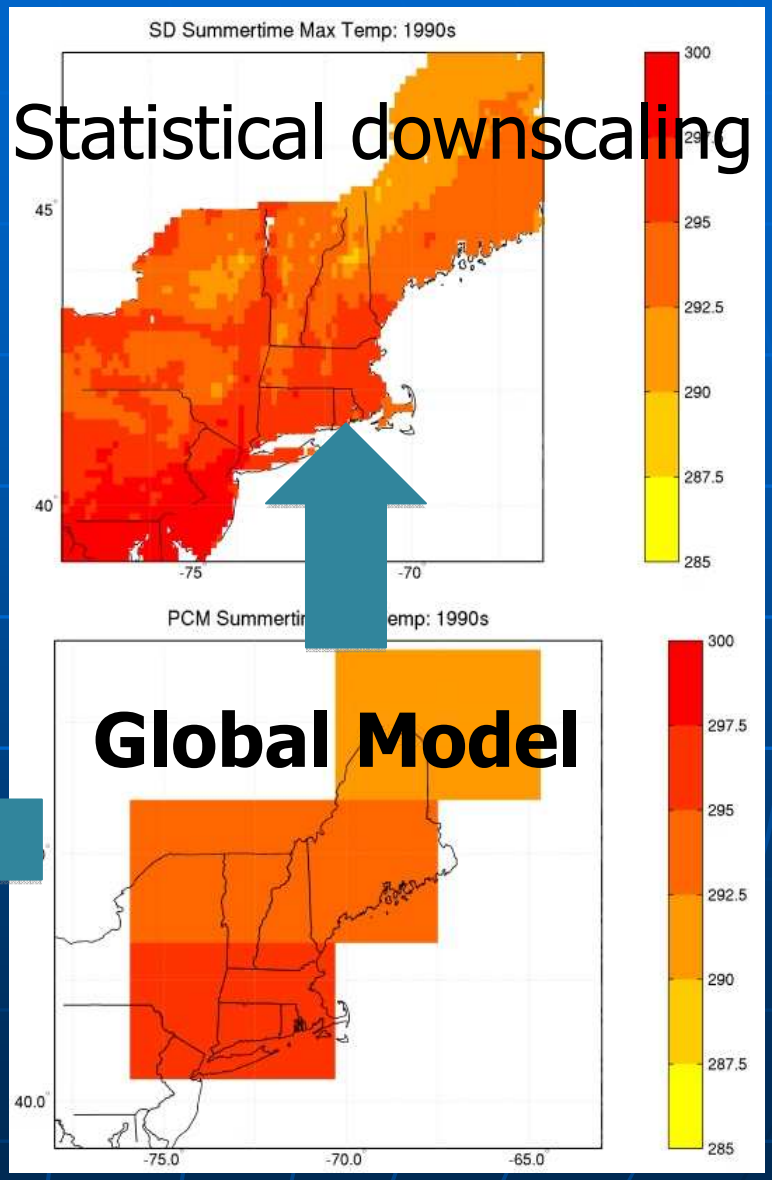


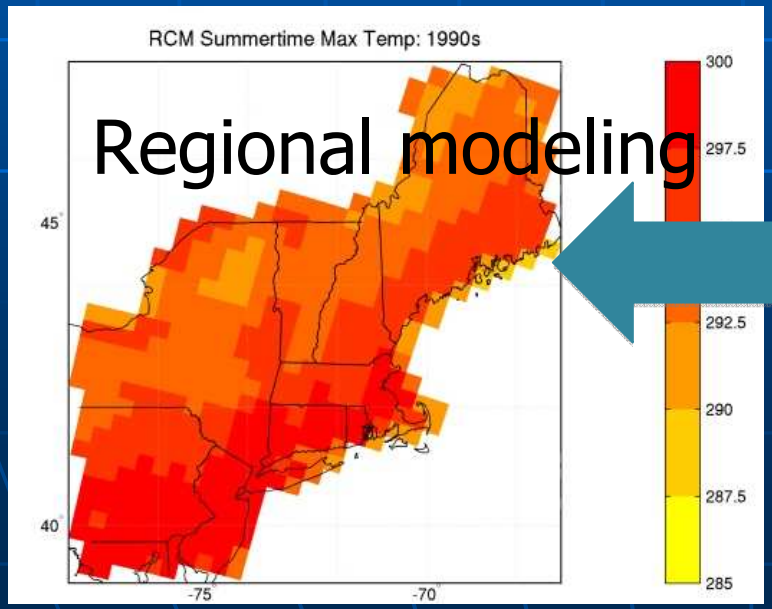

# Downscaling Step 1: Develop relationship between observed and large-scale climate fields




Ex: Northeast US JJA Tmax (1990-1999, Hayhoe et al. 2008)

# Downscaling Step 2: Use relationship to generate high-resolution fields from large-scale forcing

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